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FIRST SIGNS, CONSEQUENCES AND PREVENTIVE MEASURES OF RADIATION OF WORKERS AT URANIUM MINES

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Abstract
In this article on the basis of scientific sources the exposure of workers of uranium mines to ionizing radiation, biological effects of radiation on the body, its initial clinical signs, long-term consequences and preventive measures are analyzed on the basis of scientific sources. In the process of uranium mining, workers are exposed to alpha, beta and gamma radiation, as well as the radioactive gas - radon. These factors can cause changes at the molecular and genetic levels in the cells of the body. In the course of the study, international and domestic scientific sources on radiation hygiene, radiobiology and occupational hygiene were studied. The results of the analysis showed that compliance with radiation safety rules, the introduction of an effective ventilation system at the mines and regular medical examinations of workers significantly reduce the harmful effects of radiation.

Keywords: Ionnet radiation, uranium deposits, radon, occupational radiation, radiation sickness, lung cancer, prevention, radiation safety.

Introduction

Uranium deposits are important in the modern energy industry and are the main raw material for the production of nuclear fuel, which is used in nuclear power plants. In the process of uranium mining, there is a need to work with radioactive elements, a process that poses a certain level of danger to the health of workers. During the mining, grinding and processing of uranium ores, the decay of various radioactive substances is observed. The effects of these substances on the body are likely to be significant in the long term and are classified as occupational radiation hazards. In the process of uranium decay, various radioactive substances are formed. One of the most important of them is radon gas. Radon is a colorless and odorless radioactive gas that can accumulate in closed deposits. There is a possibility that the concentration of radon will reach a high level, especially in deposits where there is insufficient ventilation system. This gas enters the body through inhalation, causing damage to the lung tissues. Radon decay products accumulate in the respiratory tract, damaging the epithelial cells of the bronchi and alveoli.

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As a result, changes can occur in the genetic apparatus of cells. Ionizing radiation can affect biological tissues, damaging cell membranes, enzyme systems as well as DNA molecules. This process takes place via radiolysis reactions, that is, as a result of the breakdown of the water molecules inside the cell, free radicals are formed. These free radicals react with biological molecules and cause disruption of cell structures. And DNA damage causes mutations, which can later pave the way for the development of various oncological diseases.

According to international epidemiological studies, pulmonary diseases, blood disease, chronic radiation sickness, as well as disorders of the immune system are more common among workers at uranium mines. Long-term exposure to radon gas, in particular, significantly increases the risk of developing lung cancer. Some scientific studies establish a high incidence of leukemia, bronchitis, pneumosclerosis among workers who have worked for many years at uranium mines.

In addition, the long-term exposure to ionizing radiation has a negative effect on the overall physiological condition of the body. Exposure to radiation can lead to a slowdown in the activity of the blood-forming system, functional disorders of the nervous system, and a decrease in the body's ability to fight off infections. Some studies also indicate the likelihood of disruption of the functioning of the reproductive system and the occurrence of genetic alterations.

Therefore, radiation safety and protection of workers at uranium deposits are equally urgent medical and social imperatives. To reduce the radiation exposure, it is important to organize effective ventilation systems in the mines, constantly monitor the radiation level, use of personal protective equipment, and conduct regular medical examinations of workers.

The purpose of this article is to scientifically analyze radiation of uranium mine workers, its initial symptoms, long-term consequences and preventive measures. Through this research, it is planned to develop scientific conclusions aimed at reducing the risk of occupational radiation and protecting workers' health.

Materials and Techniques

This article was prepared on the basis of an analysis of scientific literature. During the study, scientific sources in the field of radiation hygiene, radiobiology and occupational hygiene were studied.

The following sources were used in the research process: World Health Organization reports; recommendations of the International Atomic Energy Agency; International standards on radiation protection, textbooks on radiobiology and occupational hygiene

Several scientific methods were used throughout the study. Biological mechanisms of exposure to radiation were studied by analytical method. By comparative method, the prevalence of diseases among workers in uranium mines in different countries was compared. The incidence frequency and risk factors for radiation-related diseases were investigated using the epidemiological analysis method.

Also, scientific data obtained using the systematization method were grouped by type of radiation, clinical signs and preventive measures

Results

The results of the analysis showed that workers working in uranium mines are exposed to several radiation sources. These types of radiation have different biological effects on the body. It turns out that in the initial stage of radiation exposure, clinical signs are often not so pronounced. This is due to the gradual effect of radiation exposure on the body. However, as a result of exposure to radiation for a long period, various pathological changes can develop in the body. However, as a result of long-term exposure, various pathological changes develop in the body.

The first clinical signs of radiation include: rapid fatigue and decreased ability to work, headaches and dizziness, drowsiness and general weakness, nausea and sometimes vomiting, decreased focus, decreased appetite

These signs are observed at the initial stage of radiation exposure. Continued exposure to radiation also causes changes in the blood system. There is a decrease in the number of leukocytes (leucopenhagenia), a decrease in platelets, and a decrease in the amount of hemoglobin. This condition slows down the work of the body's immune system and increases the susceptibility to infectious diseases.

As a result of long-term work at uranium deposits, the following diseases can develop: lung cancer, leukemia, bone marrow damage, chronic radiation sickness, genetic mutations, disorders of the reproductive system

Scientific studies show that long-term exposure to radon gas is one of the main causes of lung cancer development. High concentrations of radon gas, especially in a closed mining environment, pose a significant risk to workers.

Types of radiation found in uranium deposits and their effects on the body:

Type of glows	**Source**	**Main lesions**	**Main lesions**
Alfa nurlanish	Uranium and radon decay	Nafas yo'llari	Damage to lung tissue
Beta nurlanish	Radioactive isotopes	Skin and mucous membranes	Skin cell damage
Radon gazi	Uranium parchalanishi	Breathing	Risk of developing lung cancer
Gamma nurlanish	Comes out of radioactive substances	Butun organism	Damage to internal organs and tissues

These data indicate that radiation hazard is a multifactorial factor in the process of working in uranium deposits.

Discussion

The results of the study showed that the radiation hazard in uranium deposits is mainly due to high concentrations of radon gas. Radon gas can accumulate in a closed mining environment, and this situation poses a serious risk to the health of workers. The decay products of radon gas penetrate into the lung tissues during respiration. These radioactive particles accumulate in the

bronchi and alveoli, and are exposed over a long period of time as a source of radiation. As a result, the genetic apparatus of the lung cells is damaged, and the likelihood of developing cancer increases.

The strength of radiation exposure will depend on several factors. These are: the amount of radiation dose; duration of radiation exposure; the level of safety of working conditions; Individual sensitivity of the human body

According to International Commission on Radiation Protection (ICRP) standards, the maximum annual maximum radiation dose for radiation workers should be strictly controlled. Radiation monitoring of the deposits must be carried out regularly. Through the use of special dosimeters, the dose of radiation received by workers is determined and controlled.

Also, the presence of an efficient ventilation system in the deposits plays an important role in reducing the concentration of radon gas. Radiation hazards can increase dramatically in mines where ventilation systems are inadequate.

Preventive measures. A number of preventive measures are used to reduce radiation exposure in uranium deposits. Among technical measures, effective ventilation of deposits, radon gas reduction, and radiation monitoring are important. Ventilation system reduces the accumulation of radioactive gases in the mines.

Organizational measures are also important. Limiting working hours, alternating use of workers, and regular radiation safety training can help reduce radiation doses for workers. Personal protective equipment also plays an important role in reducing radiation exposure. These are respirators, special protective gowns and radiation dosimeters.

Medical preventive measures include regular medical examinations of workers, monitoring blood tests, and checking the functioning of the lungs. This measure provides an early detection of diseases.

Conclusion

Workers in uranium mines are professions at high risk of exposure to ionizing radiation. Radiation can cause both short-term and long-term damage to the body. Early detection of the first signs of radiation and compliance with radiation safety rules are of great importance for maintaining workers' health.

The introduction of an effective ventilation system at the deposits, enhanced radiation monitoring and routine medical supervision of workers will help to mitigate the negative effects of radiation.

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